

# GLACIER NATIONAL PARK HIGH COUNTRY CITIZEN SCIENCE MOUNTAIN GOAT AND BIGHORN SHEEP SURVEY FORM

Site Name or Description \_\_\_\_\_ Date \_\_\_\_\_ Observer Name(s) \_\_\_\_\_ Phone/Email \_\_\_\_\_  
Citizen Science Hours (includes driving, hiking + survey time)- Time at start of day: \_\_\_\_\_ Time at end of day: \_\_\_\_\_  
Trail hiked \_\_\_\_\_ Starting point \_\_\_\_\_ Ending Point \_\_\_\_\_ Number of miles \_\_\_\_\_

**SURVEY TIME AND WEATHER:** *Please review survey procedures on reverse side of this form prior to beginning survey.*

**Observation facing north:** Begin time: \_\_\_\_\_ End time: \_\_\_\_\_ **Observation facing south:** Begin time: \_\_\_\_\_ End time: \_\_\_\_\_

**Power of binoculars used:** \_\_\_\_\_ **Power of spotting scope used:** \_\_\_\_\_ (enter "none" if not used)

**Temperature (circle one):** below 30°F, 30°F to 40 °F; 40 to 50 °F; 50 to 60 °F; 60 to 70 °F; 70 to 80 °F; 80 to 90 °F; over 90 °F

**Sky (circle one):** clear sky; few clouds; partly cloudy/variable sky; cloudy/overcast; rain; fog; smoke; snow; intermittent rain showers

**Comments about survey conditions:** \_\_\_\_\_

## GOATS AND SHEEP DETECTED, LOCATION AND BEHAVIORS: (Choose from categories below and write in corresponding columns)

Time at detection of each goat or sheep group	Goats or Sheep	Quadrant where located (NE, NW, SE, SW)	Total # of goats/sheep in group	# adults if known (F=females; M= males)	** Behavior of adults upon detection	# young if known (YOY=young of year; YG= yearlings)	** Behavior of young upon detection	*** Dominant landscape feature	Photo taken (Y/N)	Comments and Photo ID # of verification photo: (include interesting interactions and comments about uncertainty or any factors that may affect your ability to accurately count and classify goats during survey; note if goats detected after survey time)
Example: 8:15	Goats	SE	8	4 (3 F, 1 unknown)	walking	4 (2 YOY, 2YG)	sitting	ledge	Y	Young goats were obscured by adults at first
Example: 8:37	Sheep	NW	5	unknown	lying down			meadow	Y	Could not classify age or sex of sheep. Group was lying in the shade, may have been 2 young of year in group

**\*\*Behavior of adults/young of year/ yearlings upon detection:** sitting/lying down; standing; feeding; walking; other (describe).

**\*\*\* Dominant landscape feature at location where group of goats or sheep was first detected:** (snow/ ice) permanent snow/icefield; (ledge) rock outcrop/cliff /ledge, (loose rock) talus/scree/moraine, (meadow) meadow dominated by grass and other forbs, (shrub/krummholz) area dominated by shrubs or sparse patches of stunted trees, (forest) area dominated by trees, (road) goat initially detected in paved or unpaved road, (trail) goat/ sheep initially detected in trail.

**TOTAL NUMBER OF GOATS SHEEP SEEN DURING SURVEY PERIODS:** *Note if quadrant not surveyed. Report all zero sightings!*

**GOATS:** NE Quadrant: \_\_\_\_\_ NW Quadrant: \_\_\_\_\_ SE Quadrant: \_\_\_\_\_ SW Quadrant: \_\_\_\_\_

**SHEEP:** NE Quadrant: \_\_\_\_\_ NW Quadrant: \_\_\_\_\_ SE Quadrant: \_\_\_\_\_ SW Quadrant: \_\_\_\_\_

**OTHER WILDLIFE SEEN IN EACH QUADRANT DURING 30 MINUTE SURVEY PERIODS:**

Time at detection	Species	Total # animals	# adults	# young	Quadrant located (NE, NW, SE, SW)	Comments (note behavior of species and any interactions with goats observed):

**OTHER MOUNTAIN GOATS OR BIGHORN SHEEP SEEN DURING HIKE (OUTSIDE OF QUADRANTS AND SURVEY PERIODS):**

Time at detection	Goats or Sheep	Total # in group	# adults if known	** Behavior of adults	# young	** Behavior of young	Photo taken (Y/ N)	UTM's (in NAD 83) Easting	UTM's (in NAD 83) Northing	Land-scape feature	Specific location (mountain, aspect, trail mileage, etc.)	Comments:

**MOUNTAIN GOAT AND BIGHORN SHEEP SURVEY PROCEDURES:**

1. Navigate to survey site using route map and description, GPS point location and photo of reference point on trail.
2. Set up your spotting scope and face due north using a compass. Declination for our area is 14.5°E (for compasses without pre-set declination).
3. Hold both arms straight out at your sides to encompass a 180° view to the north. The center line of the 180° view is the boundary between NE and NW quadrants.
4. Survey all terrain within the 180° view while facing north for 30 minutes. Complete at least 2 full sweeps with binoculars of all terrain within the 30 minute survey period. If the view of a whole quadrant is obstructed by trees or other features do not survey that quadrant.
5. Count any goats/ sheep you see. Document the initial time of detection of each goat/sheep or group of goats/ sheep and location in the chart entitled “GOATS AND SHEEP DETECTED...”. Do not double count goats/sheep that are moving. Be certain that you are not re-documenting the same individual or group.
6. Once you have completed two binocular sweeps, relocate the area(s) where goats/ sheep were seen with a spotting scope to accurately count and classify any goats/ sheep present. Spend the rest of the 30 minute survey time scanning the 180° view with a spotting scope. Photograph each group of goats or sheep seen through spotting scope.
7. Turn and face due south using compass. Repeat steps 2 through 6 for the SE and SW quadrants, surveying the 180° view to the south for 30 minutes.
8. Return survey forms and photos ASAP by fax: (406)888-7903; email: [glac\\_citizen\\_science@nps.gov](mailto:glac_citizen_science@nps.gov); or mail GNP-CCRLC, PO Box 128, West Glacier, MT 59936

**Distinguishing mountain goats and bighorn sheep by age and sex****Mountain goat kids (young of year)** • ¼ adult size

- closely follow their mothers
- horns barely visible- < 3.5" (10 cm)

**Yearlings** • ½ adult size

- horns over 3.5" (10 cm)

**Adults** • Two year olds and adults are similar in size**Adult Male Goats:** • Larger horn base; wider than eye width

- Gradual horn curve
- Stretching urination posture, external genitalia

**Adult Female Goats:** • Smaller horn base; Wider space between horns

- Sharp horn curve (curving towards end)
- Squatting urination posture

**Bighorn sheep lambs (young of year)** • ¼ adult size

- closely follow their mothers
- horns barely visible- < 3.5" (10 cm)

**Yearlings** • yearling females are about ½ adult size

- yearling males are similar in size to adult females
- horns over 3.5" (10 cm)

**Adults** • Two year olds and adults are similar in size**Adult Male Bighorn Sheep:** • Thicker horns begin to curl at two years

- Stockier body size
- Stretching posture during urination, external genitalia

**Adult Female Bighorn Sheep:** • Slender, straighter horns, up to 8 to 10"

- Similar in size to yearling male
- Squatting urination posture